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(54) Title: FABRIC SOFTENING COMPOSITIONS

(57) Abstract

The invention provides a fabric softening composition which has an increased resistance to malodour developement and which comprises: i) a liquid or soft solid derivative of a cyclic polyol (CPE) or of a reduced saccharide (RSE) resulting from 35 to 100 % of the hydroxyl groups in the polyol or saccharide being esterified or etherified, the CPE or RSE having 2 or more ester or ether groups independently attached to a C_8–C_{22} alkyl or alkenyl chain, wherein at least one of the chains attached to the ester or ether groups has at least one unsaturated bond; and ii) a deposition aid; and iii) one or more antioxidant(s), wherein the weight ratio of i) to iii) is 20:1 or greater. The invention also provides a method of reducing malodour in a composition comprising a CPE or RSE as defined above by the addition of at least one antioxidant.

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FABRIC SOFTENING COMPOSITIONS

Technical Field

The present invention relates to fabric softening compositions, in particular to those that soften without affecting the absorbency of the fabric and which suffer from a reduced tendency to develop malodour during manufacture, storage or use.

Background and Prior Art

Rinse added fabric softener compositions are well known. However, a disadvantage associated with conventional rinse conditioners is that although they increase the softness of a fabric they often simultaneously decrease its absorbency. This means that its ability to take up water decreases. This is particularly disadvantageous with towels where the consumer requires the towel to be soft, and yet, have a high absorbency.

W098/16538 (Unilever) discloses fabric conditioning compositions comprising liquid or soft solid derivatives of a cyclic polyol or a reduced saccharide which give good softening and retain absorbency of the fabric.

EP 0 380 406 (Colgate-Palmolive) discloses detergent compositions comprising a saccharide or reduced saccharide ester containing at least one fatty acid chain.

WO 95/00614 (Kao Corporation) discloses softening compositions comprising polyhydric alcohol esters and cationised cellulose.

US 5 447 643 (Hüls) discloses aqueous fabric softeners comprising nonionic surfactant and mono, di or tri fatty acid esters of certain polyols.

WO 96/15213 (Henkel) discloses textile softening agents containing alkyl, alkenyl and/or acyl group containing sugar derivatives, which are solid after esterification, in combination with nonionic and cationic emulsifiers.

Frequently a liquid or soft solid fabric softening agent, e.g. a CPE or RSE as herein-defined which addresses the above absorbency problem, is obtained by using unsaturated, usually predominantly unsaturated , fatty acid chains on the ester or ether functions. However such compositions may suffer from the development of product malodour upon manufacture, storage or use. This is obviously highly undesirable.

WO 97/13828 (P&G) discloses fabric conditioning compositions comprising a heavy metal sequestrant.

WO 96/21714 and WO 96/21715 (P&G) disclose fabric conditioning compositions comprising chelating agents.

WO 96/03481 (P&G) discloses fabric conditioning compositions comprising 1 to 20 wt% antioxidant.

The present invention is directed towards alleviating the above-mentioned problems.

The principal advantages of the compositions of the present invention are that they soften fabrics without detriment to the absorbency of the fabric, they are easily manufactured and do not suffer from unacceptable levels of malodour development upon manufacture, storage or use.

Definition of the Invention

Thus according to one aspect of the invention there is provided a fabric softening composition comprising:

i) a liquid or soft solid derivative of a cyclic polyol (CPE) or of a reduced saccharide (RSE) resulting from 35 to 100% of the hydroxyl groups in the polyol or saccharide being esterified or etherified, the CPE or RSE having 2 or more ester or ether groups independently attached to a C_8-C_{22} alkyl or alkenyl chain , wherein at least one of the chains attached to the ester or ether groups has at least one unsaturated bond, and;

ii) a deposition aid; and

iii) one or more antioxidant(s)

wherein the weight ratio of i) to iii) is 20:1 or greater.

It has been found, surprisingly, that the above compositions provide an unexpected combination of simultaneous fabric softening and retention of absorbency and exhibit improved malodour resistance, even, at elevated temperatures.

According to a further aspect of the invention, there is provided a method of reducing malodour upon manufacture, storage or use in a composition comprising a CPE or RSE as herein described by the addition of a least one antioxidant.

Detailed Description of the Invention

In the context of the present invention the initials CPE or RSE stand for a derivative of a cyclic polyol or of a reduced saccharide respectively which results from 35 to 100% of the hydroxyl groups of the cyclic polyol or reduced saccharide being esterified or etherified, the CPE or RSE having two or more ester or ether groups independently of one another attached to a C_8 to C_{22} alkyl or alkenyl chain, and in which at least one of the chains attached to the ester or ether groups has at least one unsaturated bond.

The CPE or RSE

The CPE or RSE used according to the invention does not have any substantial crystalline character at 20°C. Instead it is preferably in a liquid or soft solid state as herein defined at 20°C.

The liquid or soft solid (as hereinafter defined) CPEs or RSEs of the present invention result from 35 to 100% of the hydroxyl groups of the starting cyclic polyol or reduced saccharide being esterified or etherified with groups such that the CPEs or RSEs are in the required liquid or soft solid state. These groups typically contain unsaturation, branching or mixed chain lengths.

Typically the CPEs or RSEs have 3 or more ester or ether groups or mixtures thereof, for example 3 to 8, especially 3 to 5. It is preferred if two or more of the ester or ether groups of the CPE or RSE are independently of one another attached to a C_8 to C_{22} alkyl or alkenyl chain. The C_8 to C_{22} alkyl or alkenyl groups may be branched or linear carbon chains.

Preferably 35 to 85% of the hydroxyl groups, most preferably 40-80%, even more preferably 45-75%, such as 45-70% are esterified or etherified.

Preferably the CPE or RSE contains at least 35% tri or higher esters, eg at least 40%.

The CPE or RSE has at least one of the chains independently attached to the ester or ether groups having at least one unsaturated bond. This provides a cost effective way of making the CPE or RSE a liquid or a soft solid. It is preferred if predominantly unsaturated fatty chains, derived from, for example, rape oil, cotton seed oil, soybean oil, oleic, tallow, palmitoleic, linoleic, erucic or other

sources of unsaturated vegetable fatty acids, are attached to the ester/ether groups.

These chains are referred to below as the ester or ether chains (of the CPE or RSE).

The ester or ether chains of the CPE or RSE are preferably predominantly unsaturated. Preferred CPEs or RSEs include sucrose tetratallowate, sucrose tetrarapeate, sucrose tetraoleate, sucrose tetraesters of soybean oil or cotton seed oil, cellobiose tetraoleate, sucrose trioleate, sucrose triapeate, sucrose pentaoleate, sucrose pentarapeate, sucrose hexaoleate, sucrose hexarapeate, sucrose triesters, pentaesters and hexaesters of soybean oil or cotton seed oil, glucose tiroleate, glucose tetraoleate, xylose trioleate, or sucrose tetra-,tri-, penta- or hexa- esters with any mixture of predominantly unsaturated fatty acid chains. The most preferred CPEs or RSEs are those with monosaturated fatty acid chains, i.e. where any polyunsaturation has been removed by partial hydrogenation. However some CPEs or RSEs based on polyunsaturated fatty acid chains, eg sucrose tetralinoleate, may be used provided most of the polyunsaturation has been removed by partial hydrogenation.

The most highly preferred liquid CPEs or RSEs are any of the above but where the polyunsaturation has been removed through partial hydrogenation.

Preferably 40% or more of the fatty acid chains contain an unsaturated bond, more preferably 50% or more, most preferably 60% or more. In most cases 65% to 100%, e.g. 65% to 95% contain an unsaturated bond.

CPEs are preferred for use with the present invention. Inositol is a preferred example of a cyclic polyol. Inositol derivatives are especially preferred.

In the context of the present invention, the term cyclic polyol encompasses all forms of saccharides. Indeed saccharides are especially preferred for use with this invention. Examples of preferred saccharides for the CPEs or RSEs to be derived from are monosaccharides and disaccharides.

Examples of monosaccharides include xylose, arabinose, galactose, fructose, sorbose and glucose. Glucose is especially preferred. Examples of disaccharides include maltose, lactose, cellobiose and sucrose. Sucrose is especially preferred. An example of a reduced saccharide is sorbitan.

The liquid or soft solid CPEs can be prepared by methods well known to those skilled in the art. These include acylation of the cyclic polyol or reduced saccharide with an acid chloride; trans-esterification of the cyclic polyol or reduced saccharide fatty acid esters using a variety of catalysts; acylation of the cyclic polyol or reduced saccharide with an acid anhydride and acylation of the

cyclic polyol or reduced saccharide with a fatty acid. See for instance US 4 386 213 and AU 14416/88 (both P&G).

It is preferred if the CPE or RSE has 3 or more, preferably 4 or more ester or ether groups. If the CPE is a disaccharide it is preferred if the disaccharide has 3 or more ester or ether groups. Particularly preferred CPEs are esters with a degree of esterification of 3 to 5, for example, sucrose tri, tetra and penta esters.

Where the cyclic polyol is a reducing sugar it is advantageous if each ring of the CPE has one ether or ester group, preferably at the C_1 position. Suitable examples of such compounds include methyl glucose derivatives.

Examples of suitable CPEs include esters of alkyl(poly)glucosides, in particular alkyl glucoside esters having a degree of polymerisation from 1 to 2.

The length of the unsaturated (and saturated if present) chains in the CPE or RSE is C_8-C_{22}, preferably C_{12}-C_{22}. It is possible to include one or more chains of C_1-C_8, however these are less preferred.

The liquid or soft solid CPEs or RSEs of the present invention are characterised as materials having a solid:liquid ratio of between 50:50 and 0:100 at 20°C as determined by T_2 relaxation time NMR, preferably between 43:57 and 0:100, most preferably between 40:60 and 0:100,

such as, 20:80 and 0:100. The T_2 NMR relaxation time is commonly used for characterising solid:liquid ratios in soft solid products such as fats and margarines. For the purpose of the present invention, any component of the signal with a T_2 of less than 100 μs is considered to be a solid component and any component with $T_2 \geq 100$ μs is considered to be a liquid component.

For the CPEs and RSEs, the prefixes (e.g. tetra and penta) only indicate the average degrees of esterification. The compounds exist as a mixture of materials ranging from the monoester to the fully esterified ester. It is the average degree of esterification which is used herein to define the CPEs and RSEs.

The HLB of the CPE or RSE is typically between 1 and 3.

The CPE or RSE is preferably present in the composition in an amount of 0.5-50% by weight, based upon the total weight of the composition, more preferably 1-30% by weight, such as 2-25%, eg 2-20%.

The CPEs and RSEs for use in the compositions include those recited in the following examples, including, sucrose tetraoleate, sucrose pentaerucate, sucrose tetraerucate and sucrose pentaoleate.

The Deposition Aid

In the context of the present invention a deposition aid is defined as any material that aids deposition of the selected CPE or RSE onto a fabric during the laundering process.

The deposition aid may be selected from cationic compounds, such as cationic surfactants, nonionic surfactants, anionic surfactants, polymeric deposition aids or mixtures thereof. Quaternary ammonium compounds have been found to be particularly advantageous. A class of preferred deposition aids is fabric softening compounds.

It is preferred if the deposition aid is cationic in nature. If a cationic surfactant or cationic softening aid is not present in the formulation it is preferred if a cationic polymeric deposition aid is present. Most preferably the deposition aid is both cationic in nature and is a fabric softening compound.

Mixtures of deposition aids may be used, for example, a mixture of a cationic surfactant and a nonionic surfactant, or a fabric softening compound and a polymeric deposition aid.

Suitable cationic deposition aids include water soluble single chain quaternary ammonium compounds. Examples include cetyl trimethyl ammonium chloride, cetyl trimethyl ammonium bromide, or any of those listed in European Patent No. 258 923 (Akzo Nobel).

However, it is preferred if the deposition aid is a substantially water insoluble fabric softening compound. In

particular substantially water insoluble quaternary ammonium materials comprising a single alkyl or alkenyl chain having an average length equal to or greater than C_{20} are preferred. Even more preferable are compounds comprising a polar head group and two alkyl or alkenyl chains each having an average chain length equal to or greater than C_{14}.

Preferred fabric softening deposition aids have two long alkyl or alkenyl chains with an average chain length equal to or greater than C_{14}. More preferably each chain has an average chain length greater than C_{16}. Most preferably at least 50% of each long chain alkyl or alkenyl group has a chain length of C_{18}.

It is preferred if the long chain alkyl or alkenyl groups of the fabric softening deposition aid are predominantly linear.

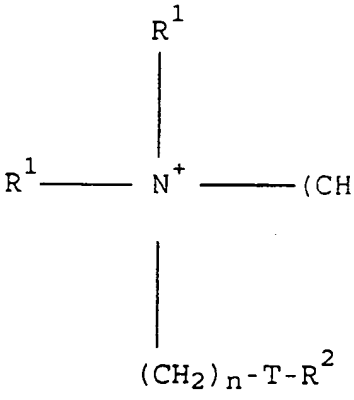
The fabric softening deposition aids used in the compositions of the invention are molecules which provide excellent softening.

"Substantially water insoluble" fabric compounds in the context of this invention are defined as fabric compounds having a solubility less than 1×10^{-3} wt% in demineralised water at 20°C. Preferably the fabric softening deposition aids have a solubility less than 1×10^{-4} wt% Most preferably the fabric softening deposition aids have a

solubility at 20°C in demineralised water from 1 x 10^{-8} to 1 x 10^{-6}wt%.

Preferred fabric softening deposition aids are quaternary ammonium compounds, preferably those with at least one ester link.

It is especially preferred if the fabric softening deposition aid is a water insoluble quaternary ammonium material which comprises a compound having two C_{12-18} alkyl or alkenyl groups connected to the molecule via at least one ester link. It is more preferred if the quaternary ammonium material has two ester links present. An especially preferred ester-linked quaternary ammonium material for use in the invention can be represented by the formula (I):



Formula (I)

wherein each R^1 group is independently selected from C_{1-4} alkyl, hydroxyalkyl or C_{2-4} alkenyl groups; and wherein

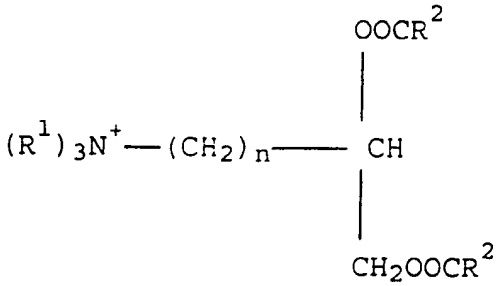
each R^2 group is independently selected from C_{8-28} alkyl or alkenyl groups;

T is  or ;

X^- is any suitable anion and n is 0 or an integer from 1-5.

Preferred materials of this class include Di(tallowoyloxyethyl) dimethyl ammonium chloride and Methyl bis-[ethyl(tallowyl)]-2-hydroxyethyl ammonium methyl sulphate.

A second preferred type of quaternary ammonium material can be represented by the formula (II):



Formula (II)

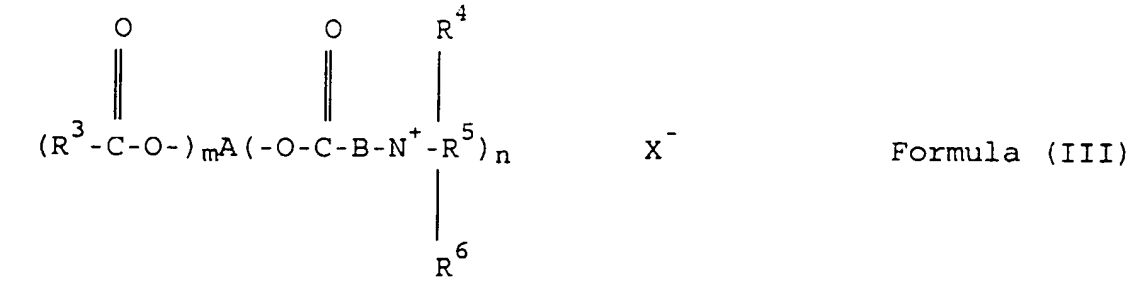
wherein R^1, n, X^- and R^2 are as defined above.

It is advantageous for environmental reasons if the quaternary ammonium material is biologically degradable.

Preferred materials of this class such as 1,2 bis[hardened tallowoyloxy]-3-trimethylammonium propane chloride and their

method of preparation are, for example, described in US 4 137 180 (Lever Brothers). Preferably these materials comprise small amounts of the corresponding monoester as described in US 4 137 180 for example 1-hardened tallowoyloxy -2-hydroxy 3-trimethylammonium propane chloride.

The fabric softening deposition aid of the composition may also be compounds having the formula (III):



Formula (III)

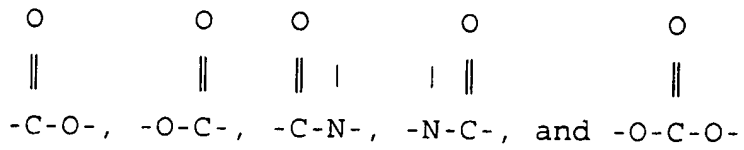
wherein X is an anion, A is an (m+n) valent radical remaining after the removal of (m+n) hydroxy groups from an aliphatic polyol having p hydroxy groups and an atomic ratio of carbon to oxygen in the range of 1.0 to 3.0 and up to 2 groups per hydroxy group selected from ethylene oxide and propylene oxide,

m is 0 or an integer from 1 to p-n, n is an integer from 1 to p-m, and p is an integer of at least 2,

B is an alkylene or alkylidene group containing 1 to 4 carbon atoms,

R^3, R^4, R^5 and R^6 are, independently from each other, straight or branched chain C_1-C_{48} alkyl or alkenyl groups, optionally with substitution by one or more functional groups and/or interruption by at most 10 ethylene oxide

and/or propylene oxide groups, or by at most two functional groups selected from



-C-O-, -O-C-, -C-N-, -N-C-, and -O-C-O-

or R^{11} and R^{12} may form a ring system containing 5 or 6 atoms in the ring, with the proviso that the average compound either has at least one R group having 22-48 carbon atoms, or at least two R groups having 16-20 carbon atoms, or at least three R groups having 10-14 carbon atoms. Preferred compounds of this type are described in EP 638 639 (Akzo).

The deposition aid may also comprise a mixture of different fabric softening compounds, for example a mixture of compounds of Formula (I) and Formula (II).

The deposition aid may also be a nonionic surfactant, such as a nonionic ethoxylated surfactant having an HLB of from about 10 to about 20. It is advantageous if the surfactant alkyl group contains at least 12 carbon atoms.

Suitable polymeric deposition aids for use with the invention include cationic and nonionic polymeric deposition aids.

Suitable cationic polymeric deposition aids include cationic guar polymers such as; the Jaguar series of polymers (ex Rhodia), cationic cellulose derivatives such as Celquats,

(ex National Starch), Ucare polymers (ex Amerchol), cationic starches e.g. potato starch such as SoftGels and Solvitose such as BDA (ex Avebe), C* bond polymers series from Cerestar, cationic polyacrylamides such as PCG (ex Allied Colloids), Flocaid series of polymers (ex National Starch) and cationic chitosan and derivatives. Cationic polymeric aids are particularly preferred in the absence of any other cationic material in the composition.

Suitable nonionic deposition aids include Pluronics (ex BASF), dialkyl PEGs, cellulose derivatives as described in GB 213 730 (Unilever), hydroxy ethyl cellulose, starch, and hydrophobically modified nonionic polyols such as Acusol 880/882 (ex Rohm & Haas).

Mixtures of any of the aforementioned deposition aids may be used.

In the fabric softening compositions the weight ratio of CPE or RSE to deposition aid is preferably within the range of from 15:1 to 1:10, more preferably within the range from 10:1 to 1:5, most preferably 8:1 to 1:3.

If a composition is required to give particularly high absorbency to fabrics it is advantageous if the weight ratio of CPE or RSE to deposition aid is at least 1:1 (especially if the deposition aid is a fabric softening compound).

If a highly softening composition is required it is advantageous if the weight ratio of a softening deposition aid to CPE or RSE is at least 2:3, preferably at least 1:1.

To give excellent softening and hydrophobicity to fabrics it is preferred if the weight ratio of softening deposition aid to CPE or RSE is from 3:2 to 1:10, more preferably from 2:3 to 1:10.

The fabric softening compositions comprise one or more antioxidants in a weight ratio to the CPE or RSE of 20:1 or more.

The deposition aid is preferably present in the compositions in an amount of 0.05-15% by weight, based upon the total weight of the composition, more preferably 0.1-10%, such as 0.5-7.5%.

Antioxidant

Any suitable antioxidant may be used according to the invention. Preferably the antioxidant comprises at least one initiation inhibitor antioxidant or at least one propagation inhibitor. Mixtures of these two types of antioxidants have been found to be particularly beneficial, especially in reducing medium to long term malodour. Any antioxidant referred to in the following examples may be used.

The compositions preferably comprise 0.0001% to 1% by weight (in total), based on the total weight of the composition, of antioxidants, more preferably 0.00015% to 0.75%, even more preferably 0.002 to 0.5%, e.g. 0.002 to 0.45%.

It has been found that initiation inhibitors antioxidants can give good short and long term malodour suppression but a mixture of propagation inhibitor and initiation inhibitor antioxidants can give a surprisingly good short and long term malodour suppression.

Suitable initiation inhibitor antioxidants include peroxide decomposers (e.g. sulphides, aryl and alkyl phosphites, metal salts of some thiodipropionates, xanthates and dithiophosphates).

Suitable peroxide decomposers include $(RO_2CCH_2CH_2)_2S$ where $R=C_{12}H_{25}$, $C_{14}H_{29}$ or $C_{18}H_{37}$ i.e. TNPP (tris-nonylphenylphosphite) available as Irgafos 186; Sandostab P-

EPQ; and Irgafos P-EPQ respectively. Where used, peroxide decomposers are preferably present at a level of between 0.001% to 0.5% by weight, most preferably 0.005% to 0.1%.

Another type of suitable initiation inhibitor antioxidant are metal ion sequestrants or deactivators. Suitable such types include N, N'-disalicylidene-1,2-propanediamine; oxalyl bis-(benzylidenehydrazide); ethylenediaminetetraacetic acid (EDTA); ethylenediamine-N,N'-disuccinic acid (EDDS); N-hydroxyethylene-diamine triacetic acid; nitrilotriacetic acid (NTA); ethylene diamine tetrapropionic acid; ethylenediamine-N,N'-diglutamic acid; 2-hydorxypropylenediamine-N,N'-disuccinic acid; triethylenetriamine hexacetic acid; diethylenetriamine pentacetic acid (DETPA); trans 1,2-diaminocyclohexane-N,N,N',N'-tetraacetic acid; ethanol diglycine; ethylenediamine tetrakis(methylene phosphonic acid) (EDTMP); 1-hydroxyethane 1,1 diphosphonic acid (HEDP); hydroxyethane dimethylenephosphonic acid; glucoic acid; citric acid; tartaric acid; isopropyl citric acid; oxydisuccinic acid; dipicolinic acid; 4,5 dihydroxy-m-benzenesulphonic acid; 8-hydroxyquinoline; sodium dithiocarbamate; sodium tetraphenylboron; ammonium nitrosophenyl hydroxylamine; ethylene diamine mono succinic acid (EDMS); iminodisuccinic acid sodium salt (IDS Na salt); Tetrakis[methylene(3,5-di-tert-butyl-4-hydroxyhydrocinnamate)]methane (Irganox 1010); Tetrakis[methylene(3,5-di-tert-butyl-4-hydroxyhydrocinnamate)]methane; 1,3,5-trimethyl-2,4,6-tris-(3',5' di-tert-butyl-4'-hydroxybenzyl)benzene (Irganox 1330) and diethylene triaminepenta(methylene phosphonate) (Dequest 2066)

Metal ion sequestrants are preferably present at a level of between 0.0001% to 0.5% by weight, based on the total weight of the composition, most preferably 0.005% to 0.1%.

Propagation inhibitor antioxidants consist primarily of hindered phenols/polyphenols. These can include those which are commonly used in the foods or plastics industries, such as butylated hydroxyanisole (BHA); butylated hydroxytoluene (BHT); tert-butyl hydroquinone (TBHQ); tocopherols; tocotrienols; ascorbic acid; ascobyl palmitate; octyl gallate; propyl gallate; lauryl gallate; N,N-bis(ethyl 3',5'-di-tert-butyl-4-hydroxybenzoate; 2-(N,N-dimethyl-amino)ethyl 3',5'-di-tert-butyl-4'hydroxybenzoate-N-cocoamine; 2-(N-methyl-N-cocamino)ethyl 3',5'-di-tert-butyl-4'-hydroxybenzoate; 2,2'-methylenebis(4-methyl-6-t-butylphenol), 4,4'-butylidenebis (2-tert-butyl-5-methylphenol), n-octadecyl 3,5-di-tert-butyl-4-hydroxyhydrocinnamate, 1,1,3-tris(3-tert-butyl-4-hydroxy-6-methylphenyl)butane.

Inhibitor antioxidants are preferably present at a level of 0.0001% to 0.5% by weight, based on the total weight of the composition, more preferably 0.0002% to 0.05%, most preferably 0.0002% to 0.02%.

The weight ratio of the initiation inhibitor (i) to the propagation inhibitor (ii) is preferably within the range 10:1 to 1:10, more preferably 10:1 to 1:5, even more preferably 8:1 to 1:1, e.g. 6:1 to 1:1.

The weight ratio of CPE or RSE to total antioxidant is 20:1 or greater, preferably 50:1 or greater, more preferably 75:1 or greater. The weight ratio may be as high as 1500:1 or greater. It is preferred that the weight ratio has an upper limit of 3000:1, e.g. 2500:1.

Composition pH

The compositions of the invention preferably have a pH from 1.5 to 7, more preferably from 1.5 to 5.

Other Ingredients

The compositions can also contain fatty acids, for example C_8 - C_{24} alkyl or alkenyl monocarboxylic acids, or, polymeric carboxylic acids. Preferably saturated fatty acids are used, in particular, hardened tallow C_{16}-C_{18} fatty acids.

The composition can also contain one or more optional ingredients, selected from electrolytes, non-aqueous solvents, pH buffering agents, perfumes, perfume carriers, fluorescers, colorants, hydrotropes, antifoaming agents, antiredeposition agents, polymeric and other thickeners, enzymes, optical brightening agents, opacifiers, anti-shrinking agents, anti-wrinkle agents, anti-spotting agents, germicides, fungicides, anti-corrosion agents, drape imparting agents, antistatic agents, sunscreens, colour care agents and ironing aids.

If the product is a liquid it may be advantageous if a viscosity control agent is present. Any viscosity control

agent used with rinse conditioners is suitable for use with the present invention, for example biological polymers such as Xanthum gum (Kelco ex Kelsan and Rhodopol ex Rhone-Poulenc), Guar gum (Jaguar ex Rhone-Poulenc), starches and cellulose ethers. Synthetic polymers are useful viscosity control agents such as polyacrylic acid, poly vinyl pyrrolidone, polyethylene, carbomers, cross linked polyacrylamides such as Acosol 880/882 polyethylene and polyethylene glycols.

It is preferred that the compositions are substantially free of bleaches. Preferably the compositions are entirely free of bleaches.

Also suitable as viscosity modifiers are decoupling polymers and deflocculating polymers.

Product Form

The compositions may be in any form conventionally used for fabric softening compositions e.g., powder, paste, gel or liquid. Liquids, especially emulsions are preferred.

The compositions may be prepared by any suitable method. Where the antioxidant is oil soluble, e.g. the propagation inhibitor, the antioxidant is suitably pre-added with the CPE or RSE. Where the antioxidant is water soluble, e.g. the initiation inhibitor, especially metal sequestrants, the inhibitor is typically post-dosed to a pre-formed emulsion containing the CPE or RSE.

Examples

The invention is illustrated by the following non-limiting examples. Further examples within the scope of the present invention will be obvious to the man skilled in the art.

Examples 1-13 and 14-24

The effect of the anti-oxidant in reducing malodour development on storage in fabric softening compositions comprising a CPE of the and a deposition aid is demonstrated below.

All %'s are by weight based on the total weight of the composition and represent the amount of active compound. Examples 1 and 14 are controls which do not contain antioxidant. In Ryoto 0-170, 85% or greater of the fatty acid chains contain an unsaturated bond.

Examples 2 to 13 were prepared by dissolving the propagation inhibitor antioxidant (Irganox 1330 or Irganox 1010) in the CPE (Ryoto 0-170) and adding this to a separate mixture of a cationic and water (in an amount to make the composition up to 100 weight %). The resultant composition was mixed using a low shear Heidolph mixer to produce an emulsion.

In examples 6 to 13, the initiation inhibitor antioxidant (Dequest 2066) was post-dosed to this emulsion.

Examples 14 to 24 were prepared by mixing the cationic surfactant (CTAC) with water and then adding to this mixture

the CPE (Ryoto O-170) at room temperature under conditions of high shear to produce an emulsion.

In examples 15 and 22 to 24, the propagation inhibitor antioxidant (Irganox 1010) was dissolved in the CPE prior to emulsification.

In example 16 to 24, the initiation inhibitor antioxidant (Dequest 2066, DTPA or Na IDS) was post-dosed into the final emulsion.

The formulations of Examples 1-13 and 14-24 are shown in Tables 1 and 2 respectively.

Table 1

Example	% Ryoto O-170[a]	% CTAC b	% initiation inhibitor DEQUEST 2066[c]	% propagation inhibitor A	% propagation inhibitor B
1 (control)	4.5	1.0	-	-	-
2	4.5	1.0	-	0.00225	-
3	4.5	1.0	-	0.0045	-
4	4.5	1.0	-	-	0.00225
5	4.5	1.0	-	-	0.0045
6	4.5	1.0	0.01	0.00225	-
7	4.5	1.0	0.01	0.0045	-
8	4.5	1.0	0.01	-	0.00225
9	4.5	1.0	0.01	-	0.0045
10	4.5	1.0	0.05	0.00225	-
11	4.5	1.0	0.05	0.0045	-
12	4.5	1.0	0.05	-	0.00225
13	4.5	1.0	0.05	-	0.0045

[a]sucrose pentaoleate (from Mitsubishi-Kagaku Food Corporation)

[b]cetyl trimethyl ammonium chloride; from Aldrich (as a 25% solution).

[c] diethylene triaminepenta(methylene phosphonate); available from solutia.

"A" is Irganox 1330; 1,3,5-trimethyl-2,4,6-tris-(3',5' di-tert-butyl-4'-hydroxybenzyl)benzene.

"B" is Irganox 1010; Tetrakis[methylene(3,5-di-tert-butyl-4-hydroxyhydrocinnamate)]methane (Both from Ciba Geigy).

Table 2

Example	% Ryoto 0-170	% CTAC	% propagation Inhibitor Irganox 1010	Initiation Inhibitor (type and %)	Water
14 (control)	4.5	0.5	-	None	To 100
15	4.5	0.5	0.0045	None	To 100
16	4.5	0.5	-	0.01 - Dequest 2066[a]	To 100
17	4.5	0.5	-	0.01 - DTPA[b]	To 100
18	4.5	0.5	-	0.01 - Na IDS[c]	To 100
19	4.5	0.5	-	0.05 - Dequest 2066[a]	To 100
20	4.5	0.5	-	0.05 - DTPA[b]	To 100
21	4.5	0.5	-	0.05 - Na IDS[c]	To 100
22	4.5	0.5	0.0045	0.01 - Dequest 2066[a]	To 100
23	4.5	0.5	0.0045	0.01 - DTPA[b]	To 100
24	4.5	0.5	0.0045	0.01 - Na IDS[c]	To 100

[a]diethylene triamine-N,N,N',N'',N''-pentakis methylene phosphoric acid (from Solutia)

[b]diethylene triamine pentaacetate (from Akzo Nobel)

[c]iminodisuccinic acid sodium salt (from Bayer)

The samples were stored in screw-top glass bottles at 37°C to 45°C. At the intervals given in Tables 3 and 4 the bottles were removed from storage and the samples assessed for the development of malodour (which was determined by assessing the level of a rancid 'fatty' smell present). Before each assessment the samples allowed to equilibrate at room temperature. The malodour was assessed at room temperature by sniffing the odours from the equilibrated sample and assigning a value between 0 and 5 to indicated the level of malodour. Zero was given if the sample had no perceivable rancid smell and five was given for a very strong rancid smell. At least ten people assessed each sample and the average value was calculated from their response.

As a marker of a value of 5 for a rancid fat an emulsion containing 1% CTAC and 4.5% by weight Priolube 1446 (neopentyl glycol dioleate ex Unichema) was stored at 45°C for 4 weeks.

The malodour values of Examples 1-13 and 14-24 are shown in Tables 3 and 4 respectively.

Table 3 below shows the malodour values determined for examples 1-13 over a 27 week testing period with storage between 37°C-45°C.

Table 3

Example number	Week 1	week 2	week 4	week 6	week 8	week 12	week 15	week 27
1 (control)	1.7	2	2.2	3.53	4	4.53	4.22	4.31
2	1.1	1.64	1.8	2.71	3.06	3.42	4.16	4.69
3	1.7	1.86	1.53	2.5	2.94	3.32	4.16	4.38
4	1.4	1.71	1.4	2.43	2.82	2.89	4.05	4.38
5	1.4	2.07	1.87	2.79	2.94	3.26	4.11	4.69
6	0.9	0.85	1.13	1.2	1.47	1.5	1.72	2.13
7	0.8	1.15	1.13	1.2	1.47	1.22	1.61	1.94
8	1.4	1.46	1.27	1.4	1.6	1.56	1.42	2.06
9	1.3	1.31	1.33	1.47	1.67	1.5	1.69	2
10	2.3	2.5	2.27	3.00	2.61	2.84	2.67	3.19
11	2.1	2.14	2.00	2.73	2.44	2.74	2.39	3.19
12	2.0	2.21	2.07	2.73	2.56	2.84	2.28	3.19
13	2.0	2.0	1.67	2.73	2.33	2.95	2.56	3.44

The above results demonstrate the suppression of malodour in a sample containing a predominantly unsaturated CPE and a deposition aid by the addition of an antioxidant. Where the antioxidant is a mixture of a propagating inhibitor and an initiation inhibitor then longer term malodour suppression was achieved.

Furthermore advantageous synergistic results were obtained by using 0.01% by weight initiation inhibitor with 0.00225-0.0045% by weight propagation inhibitor (see examples 6-9).

Table 4 below shows the malodour values determined for examples 14-24 over a 4 week testing period with storage at 45°C.

Table 4

Example	Week 1	Week 2	Week 3	Week 4
14 (control)	2.50	2.71	2.76	3.00
15	-	2.43	2.75	2.83
16	1.83	1.86	1.17	1.75
17	1.67	1.79	1.33	1.83
18	1.58	1.93	2.17	1.50
19	2.17	1.86	1.58	1.83
20	2.25	2.00	1.50	1.67
21	1.75	1.93	1.42	1.83
22	1.60	1.07	1.00	1.42
23	1.17	1.57	1.25	0.83
24	1.00	1.21	1.75	1.25

The results in table 4 demonstrate that when the only antioxidant present is an initiation inhibitor, odour suppression was achieved. Where the antioxidant comprised both a propagation and an initiation inhibitor, significantly improved odour suppression was obtained. This is surprising given that little or no odour suppression was observed when the only antioxidant present was the propagation inhibitor.

Therefore, there is a clear synergistic effect between the propagation and the initiation inhibitor.

Further compositions which have improved malodour suppression in the presence of propagation and the initiation inhibitor are given in the following examples.

Examples 25 to 34

Examples 25 to 28 in Table 5 below were prepared by mixing the listed components together in water.

Table 5 (Mixtures with CTAC)

Example	25	26	27	28
Cetyl trimethyl ammonium chloride (CTAC)	1	1	1	1
Sucrose pentaoleate (Ryoto 0-170)	4			
Sucrose tetraoleate (oily liquid)		4		
Sucrose pentaerucate (Ryoto ER-190) (soft liquid)			4	
Sucrose tetraeureate (Ryoto ER-290) (soft liquid)				4
Irganox 1010	0.002	0.002	0.002	0.002
Dequest 2066	0.01	0.01	0.01	0.01
Water	95	95	95	95
CTAC:oil ratio	1:4	1:4	1:4	1:4

Irganox 1010, Dequest 2066 and CTAC are described above.

The Ryoto products are available from Mitsubishi-Kagaku Food Corporation.

The Examples in Tables 6 to 9 below were prepared by heating the ingredients together at 80°C, and mixing at high shear.

Table 6: Mixtures with HEQ (fabric softening compound)

Example	29	30	31
HEQ[1]	0.86	2.57	1.71
Fatty Acid	0.14	0.43	0.39
Sucrose pentaoleate (Ryoto 0-170) (oily liquid)	4	2	3
Irganox 1010	0.004	0.002	0.003
Dequest 2066	0.01	0.01	0.01
Water	95	95	95
HEQ:oil ratio	1:4	3:2	2:3

HEQ[1] is 1,2 bis[hardened tallowoyloxy]-3- trimethylammonium propane chloride available from Hoechst.

Table 7; mixtures with Arquad 2-HT

Example	32	33	34
Arquad 2-HT[a]	1	1	1
Sucrose tetraoleate (oily liquid)	4		
Sucrose pentaeureate (Ryoto ER-190) (oily liquid)		4	
Sucrose tetraeureate (Ryoto ER-290) (oily liquid)			4
Irganox 1010	0.004	0.004	0.004
Dequest 2066	0.01	0.01	0.01
Water	95	95	95
Arquad 2-HT:oil	1:4	1:4	1:4

[a]Arquad 2-HT is ditallow dimethyl ammonium chloride

Example 35

Example 35 was prepared as a 5% total active emulsion/dispersion in water comprising 4.5% sucrose tetraerucate (oily liquid, Ryoto ER 290), 0.5% CTAC, 0.01% Dequest 2066, 0.0045% Irganox 1010 and 0.2% of a polymer deposition aid as given below:-

Example 35a	FlocAid 34	(ex National Starch)
Example 35b	Softgel BDA	(ex Avebe)

Example 36

Example 36 was prepared as a 1:4 emulsion/dispersion (5% total active) of DEEDMAC:sucrose pentaoleate (Ryoto O-170) by mixing at high temperatures. To this is added , 0.01% Dequest 2066 and 0.004% Irganox 1010.

Example 37

A fully formulated fabric softening composition as according to the present invention was prepared as below:

	% by weight
Genapol C150[a]	1.6
ABS[b]	0.4
Ryoto O-170	15.4
Cationic potato starch[c]	2
Perfume	0.96

Preservative	Minor
Dye	Minor
Na IDS	0.01
Irganox 1330	0.015
Water	Balance

[a]Coco alcohol 15EO (ex Clariant)

[b]dodecyl benzene sulphonic acid sodium salt (ex Aldrich Chemical Company)

[c]Softgel BDA (ex Avebe)

Example 38

Table 8 shows the T_2 NMR solid:liquid ratio of CPEs and RSEs used according to the present invention. The ratios were measured at 20°C. The degree of esterification /etherification is stated.

Table 8

Material	Solid:Liquid ratio at 20°C	Degree and % of esterification	Physical Form
Ryoto 0-170	0:100	5/8 62.5%	Liquid
Ryoto ER-290	0:100	4/8 50%	Liquid
Ryoto ER-190	0:100	5/8 50%	soft solid
Sucrose tetraoleate	0:100	4/8 50%	Liquid
Sucrose octaoleate	0:100	8/8 100%	Liquid

The Ryoto materials are described above.

Examples 39 to 52

All the compositions in table 9 were prepared as follows: The propagation inhibitor was dissolved in the sucrose tetraoleate in a weight ratio of 99.9:0.1. This mixture was then comelted with the TEA and Coco-15EO and then added to water at 60°C with stirring using a low shear Heidolph mixer. The resulting mixture was stirred for 10 minutes before being cooled to room temperature. Where an initiation inhibitor was used, it was post-dosed to the final mixture as a 5% solution in water with mixing.

Table 9

Example	% TEA[a]	% sucrose tetra oleate[b]	% Coco 15EO	% Propagation Inhibitor (Irganox 1330)	Initiation Inhibitor (% and type)	% Water
39	10.6	3.6	0.1	0.0036	0.01 - EDDS[c]	To 100
40	10.6	3.6	0.1	0.0036	0.01 - Dequest 2066	To 100
41	10.6	3.6	0.1	0.0036	0.01 - Na IDS	To 100
42	10.6	3.6	0.1	0.0036	0.01 - DTPA	To 100
43	10.6	3.6	0.1	0.0036	0.01 - EDTA[d]	To 100
44	10.6	3.6	0.1	0.0036	0.01 - Dequest 2047[e]	To 100
45	10.6	3.6	0.1	0.0036	None	To 100
46	7.5	7.5	0.1	0.0075	0.01 - EDDS	To 100
47	7.5	7.5	0.1	0.0075	0.01 - Dequest 2066	To 100
48	7.5	7.5	0.1	0.0075	0.01 - Na IDS	To 100
49	7.5	7.5	0.1	0.0075	0.01 - DTPA	To 100
50	7.5	7.5	0.1	0.0075	0.01 - EDTA	To 100
51	7.5	7.5	0.1	0.0075	0.01 - Dequest 2047	To 100
52	7.5	7.5	0.1	0.0075	None	To 100

[a]methyl bis-[ethyl(tallowyl)]-2-hydroxyethyl ammonium methyl sulphate (available as a 90% paste under the trade name Rewoquat WE18 from Goldschmidt (ex Witco)).

[b]a sucrose polyoleate with an approximate degree of esterification of 4.

[c]ethylene diamine-N, N' disuccinic acid (from Associated Octel).

[d]ethylene diamine tetra acetic acid (from Contract Chemicals).

[e]ethylene diamine tetra(methylene phosphonate) from Solutia.

Table 10 below shows the malodour values determined for examples 39-52 over a 9 week testing period with storage at 45°C.

All samples were stored in loosely closed glass bottles at 45°C. At weekly intervals, the samples were removed form the oven and allowed to cool to room temperature prior to panelling. Malodour scores were ranked on a 0 to 5 basis, whereby 0 = no malodour smell and 5 = extremely strong malodour. The results are given in table 10

Table 10

Example	Week 1	Week 2	Week 3	Week 4	Week 6	Week 9
35	0.88	1.37	1.28	1.18	1.38	1.30
36	1.59	1.63	1.00	1.27	1.31	1.10
37	1.29	1.47	1.43	1.82	1.23	1.40
38	1.18	1.32	1.07	1.64	1.23	1.65
39	1.12	1.47	1.29	1.36	1.15	1.60
40	1.41	1.32	1.21	1.45	1.08	1.70
41	2.12	1.89	1.71	2.09	1.77	2.50
42	1.65	1.76	1.75	1.73	1.62	1.70
43	1.65	1.47	1.75	1.82	1.62	1.5
44	1.71	1.18	1.92	1.55	1.08	1.10
45	1.82	1.47	1.83	1.18	1.46	1.00
46	1.65	1.53	1.50	1.45	1.38	1.50
47	1.82	1.59	1.75	1.64	1.31	1.40
48	2.12	1.65	2.25	2.27	2.38	2.20

The results demonstrate that when only the propagation inhibitor was used in the softening compositions, good odour suppression was observed over the 9 week period. When a mixture of the propagation and initiation inhibitors was used in the softening compositions, significantly better odour suppression was observed over the 9 week period.

Claims

1) A fabric softening composition comprising:

i) a liquid or soft solid derivative of a cyclic polyol (CPE) or of a reduced saccharide (RSE) resulting from 35 to 100% of the hydroxyl groups in the polyol or saccharide being esterified or etherified, the CPE or RSE having 2 or more ester or ether groups independently attached to a C_8-C_{22} alkyl or alkenyl chain, wherein at least one of the chains attached to the ester or ether groups has at least one unsaturated bond, and

ii) a deposition aid, and

iii) one or more antioxidant(s),

wherein the weight ratio of i) to iii) is 20:1 or greater.

2) A composition according to claim 1 wherein the CPE or RSE contains at least 35% tri or higher esters.

3) A composition according either claim 1 or claim 2 wherein the CPE or RSE has 40-80%, preferably 45-75%, of the hydroxyl groups esterified and/or etherified.

4) A composition according to any one of the preceding claims wherein the CPE OR RSE has 4 or more hydroxy groups esterified or etherified.

5) A composition according to any one of the preceding claims wherein the CPE or RSE is derived from a monosaccharide or disaccharide.

6) A composition according to any one of the preceding claims wherein the deposition aid is selected from cationic surfactants, nonionic surfactants, anionic surfactants, polymeric deposition aids, fabric softening compounds or mixtures thereof.

7) A composition according to claim 6 wherein the fabric softening compounds are quaternary ammonium compounds.

8) A composition according to any one of the preceding comprising 0.5%-50% by weight of the CPE or RSE, preferably 1%-30%.

9) A composition according to any one of the preceding claims wherein the one or more antioxidant(s) comprises at least one initiation inhibitor, or at least one propagation inhibitor, or mixtures thereof.

10) A composition according to any one of the preceding claims wherein the composition comprises 0.0001% to 1% by weight of the one or more antioxidant(s).

11) A composition according to any one of the preceding claims wherein the weight ratio of the CPE or RSE to antioxidant(s) is 50:1 or greater , preferably 75;1 or greater.

12) A composition according to any preceding claim which is a liquid, preferably an emulsion.

13) A method of reducing malodour in a composition comprising a CPE or RSE as defined in claim 1 by the addition of at least one antioxidant.

14) A method according to claim 13 wherein the antioxidant is as defined in any one of claims 9 to 11.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/01699

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C11D1/66

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 98 16538 A (UNILEVER) 23 April 1998 (1998-04-23) cited in the application page 5, line 25 -page 15, line 17 page 16, paragraph 1 claims 1-8,10-12	1-10, 12-14
Y	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 10, 31 October 1996 (1996-10-31) & JP 08 158258 A (KAO CORP), 18 June 1996 (1996-06-18) abstract	1-10, 12-14

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 August 2000	06. 09. 2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Bertran Nadal, J

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

In ıtional Application No
PCT/GB 00/01699

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with [illegible]on, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96 15213 A (HENKEL KGAA) 23 May 1996 (1996-05-23) cited in the application page 14, paragraph 2 examples A5-A7 claims 1,2,8	1,5-7,12
A	EP 0 325 184 A (COLGATE PALMOLIVE CO) 26 July 1989 (1989-07-26) page 10, line 42-45 example 1 claims 1-5,10	1,5,6, 8-10,12
A	WO 96 03492 A (PROCTER & GAMBLE) 8 February 1996 (1996-02-08) examples I-V, claim 1	1,5-9
A	EP 0 530 958 A (COLGATE PALMOLIVE CO) 10 March 1993 (1993-03-10) examples 2-4	1,6,9, 10,12

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INTERNATIONAL SEARCH REPORT

ternational application No.
PCT/GB 00/01699

Box I Observations where c[redacted] claims were found unsearchable (Continuati[redacted] item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 1, 6, 7, 9, 10, 13, 14
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 1, 6, 7, 9, 10, 13, 14

Present claims 1, 6, 7, 9, 10, 13 and 14 relate to a compound defined by reference to a desirable characteristic or property, namely:

"A fabric softening composition comprising ... (ii) a deposition aid and (iii) one or more antioxidant(s)"

The claims cover all compounds having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT for only a very limited number of such compounds. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Independent of the above reasoning, the claims also lack clarity (Article 6 PCT). An attempt is made to define the compound by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to the compounds mentioned in the description at page 9, line 4-page 18, line 12 and especially those disclosed in the examples.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/01699

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 9816538	A	23-04-1998	AU	5051098 A	11-05-1998
			EP	0934328 A	11-08-1999
			ZA	9709231 A	15-04-1999
JP 08158258	A	18-06-1996	NONE		
WO 9615213	A	23-05-1996	DE	4440620 A	15-05-1996
			AT	176494 T	15-02-1999
			DE	59505051 D	18-03-1999
			EP	0792337 A	03-09-1997
			ES	2128785 T	16-05-1999
EP 0325184	A	26-07-1989	US	4800038 A	24-01-1989
			AT	87327 T	15-04-1993
			AU	2844689 A	27-07-1989
			BR	8900216 A	12-09-1989
			CA	1323822 A	02-11-1993
			DE	68905493 D	29-04-1993
			DE	68905493 T	29-07-1993
			DK	27189 A	22-07-1989
			ES	2053822 T	01-08-1994
			GR	3007478 T	30-07-1993
			JP	1266196 A	24-10-1989
			MX	163803 B	22-06-1992
			NZ	227645 A	25-10-1991
			ZA	8900163 A	26-09-1990
WO 9603492	A	08-02-1996	US	5474691 A	12-12-1995
			CA	2192801 A	08-02-1996
			EP	0773987 A	21-05-1997
			JP	10504610 T	06-05-1998
			US	5962402 A	05-10-1999
			US	5733855 A	31-03-1998
			US	5869443 A	09-02-1999
EP 0530958	A	10-03-1993	AT	172237 T	15-10-1998
			AU	657118 B	02-03-1995
			AU	1300792 A	11-03-1993
			BR	9202088 A	06-04-1993
			CA	2076718 A	07-03-1993
			DE	69227292 D	19-11-1998
			FI	921148 A	07-03-1993
			GR	92100112 A,B	21-06-1993
			JP	5140869 A	08-06-1993
			MX	9201444 A	01-03-1993
			NO	300384 B	20-05-1997
			NZ	242021 A	27-04-1995
			PT	100303 A,B	30-06-1993
			TR	28408 A	14-06-1996
			US	5358647 A	25-10-1994
			US	5332513 A	26-07-1994
			ZA	9201989 A	20-09-1993